



A.D. 1847 N° 11,628.

SPECIFICATION

OF

JAMES WILLS WAYTE.

SELF-FEEDING FURNACES, &c.

LONDON:

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1854.



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Self-feeding Furnaces, &c.

WAYTE'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES WILLS WAYTE, of Leeds, in the County of York, Printer, send greeting.

WHEREAS Her most Excellent Majesty, by Her Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing
5 date at Westminster, the Eighteenth day of March, One thousand eight hundred and forty-seven, in the tenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Wills Wayte, my exors, admors, and assigns, Her especial licence, full power, sole privilege, and authority, that I, the said James Wills Wayte, my exors,
10 admors, and assigns, and such others as I, the said James Wills Wayte, should at any time agree with, and no others, from time to time and at all times hereafter during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within that part of the United Kingdom of Great Britain and Ireland called England, and Her Majesty's Dominion of
15 Wales, and the Town of Berwick upon Tweed, and also within the Islands of Guernsey, Jersey, Alderney, Sark, Man, and all Her Majesty's Colonies and Plantations abroad, my Invention of "CERTAIN IMPROVEMENTS IN SELF-FEEDING FURNACES, ADAPTED BOTH FOR LAND AND MARINE PURPOSES, FOR THE BETTER PREVENTION OF SMOKE ARISING FROM FIRES USED IN SUCH FURNACES;" in
20 which Letters Patent there is contained a proviso requiring that I, the said James Wills Wayte, shall particularly describe and ascertain the nature of the said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, and cause the same to be

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inrolled in Her Majesty's High Court of Chancery within six calendar months next and immediately after the date of the now reciting Letters Patent.

NOW KNOW YE, that I, the said James Wills Wayte, do hereby declare that the nature of my said Invention, and in what manner the same is to be performed, are fully described in and by the present Specification thereof, 5 reference being had to the Drawings hereunto annexed, that is to say:—

The improvements which constitute my said Invention have relation to that class of self-feeding furnaces in which, for the better prevention of smoke, a progressive motion is imparted to the burning fuel by means of moving (instead of fixed) fire-bars, and they have for their object to simplify the mode 10 of producing such progressive motion, and to prevent more effectually the escape of any of the products of combustion in an unconsumed and offensive state, and the manner in which these improvements are carried into effect is represented in the Drawings hereunto annexed and in the following description thereof. I construct furnaces of the class aforesaid either in the manner 15 shewn in the Drawings, Figures 1, 1^a, 2, 2^a, 3, 3^a, 4, 4^a, 5, 5^a, 5^b, 5^c, or in that shewn in Figure 6 and Figure 6^a.

Figure 1 is a side elevation of the first form of furnace; Figure 2, a longitudinal section of the same; Figure 3, a front view; Figure 4, a back view; and Figure 5, a top plan. A, A, represent the framework of the furnace, 20 and *a, a*, wheels on which it is mounted in order that it may be drawn readily out of its place when required to be repaired or cleaned. B, B, are the fire-bars, which are placed in rows lengthwise, each row consisting of two bars laid end to end. In the furnace represented in the Drawings there are eleven rows of bars, but they may be of any other odd number, as nine or thirteen or 25 fifteen. A side view and cross section of two of these bars detached from the furnace are given separately in Figure 1^a and Figure 2^a; they are of a narrow oblong shape and hollow from top to bottom, that is, through and through, except at the two ends, which are closed. In their cross section they are exteriorly rectangular, but on the inside of (nearly) an inverted V form. C¹, 30 C², are two sets of carriages, which support the bars and give motion to them in manner herein-after explained. Side views of one of each of these sets of carriages are given separately in Figure 3^a and Figure 4^a. Each carriage supports two fire-bars laid lengthwise end to end, and dropped down upon uprights *a, a*, which prevent them from shifting either sideways or endways. 35 The set of carriages C¹ includes the two outermost ones at each side, and every other of the intermediate carriages, namely, the 3rd, 5th, 7th, and 9th, while the set C² comprehends the second outermost carriages on each side and such of the intermediate carriages as alternate with the intermediate ones of

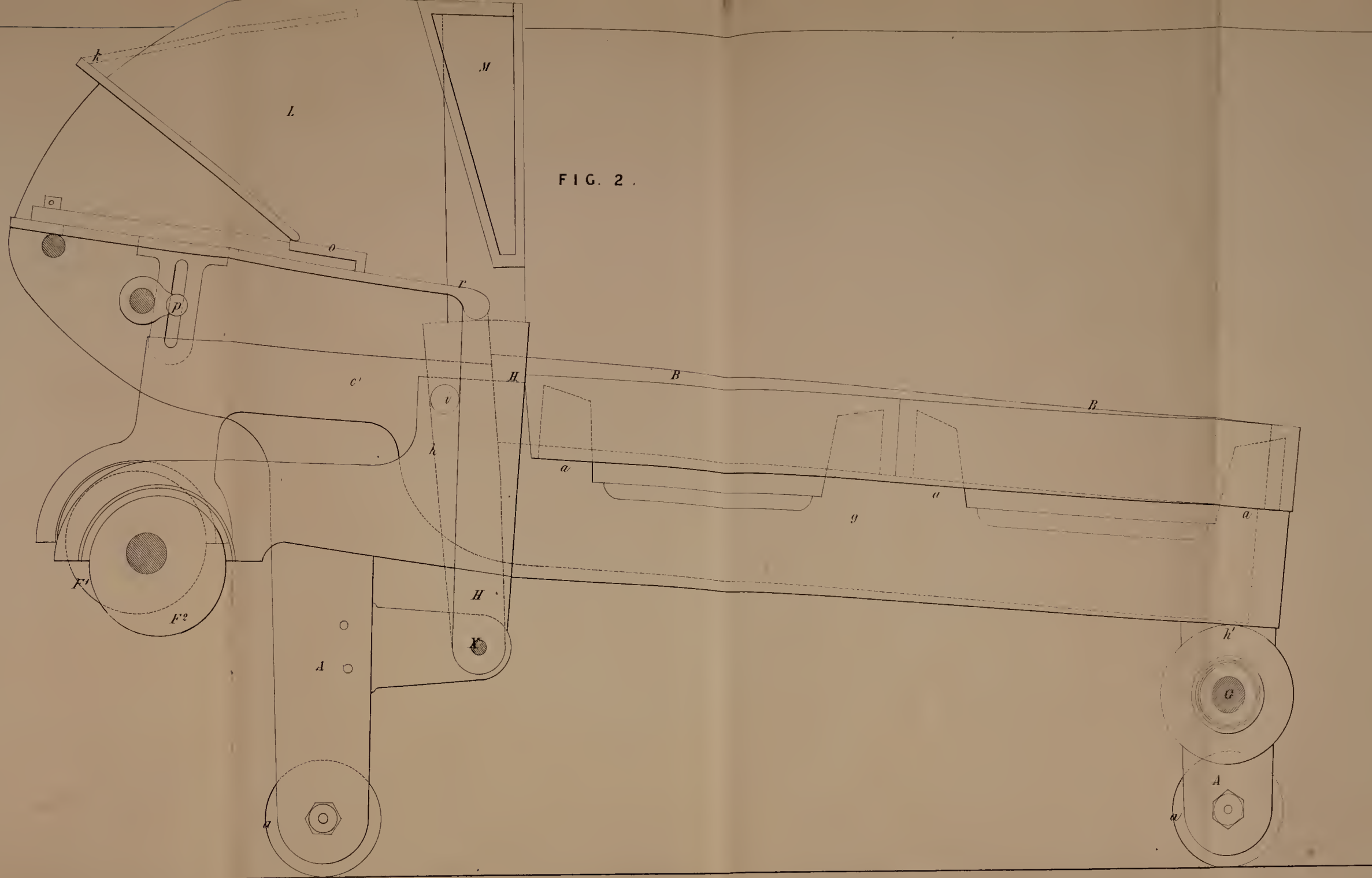


FIG. 2.

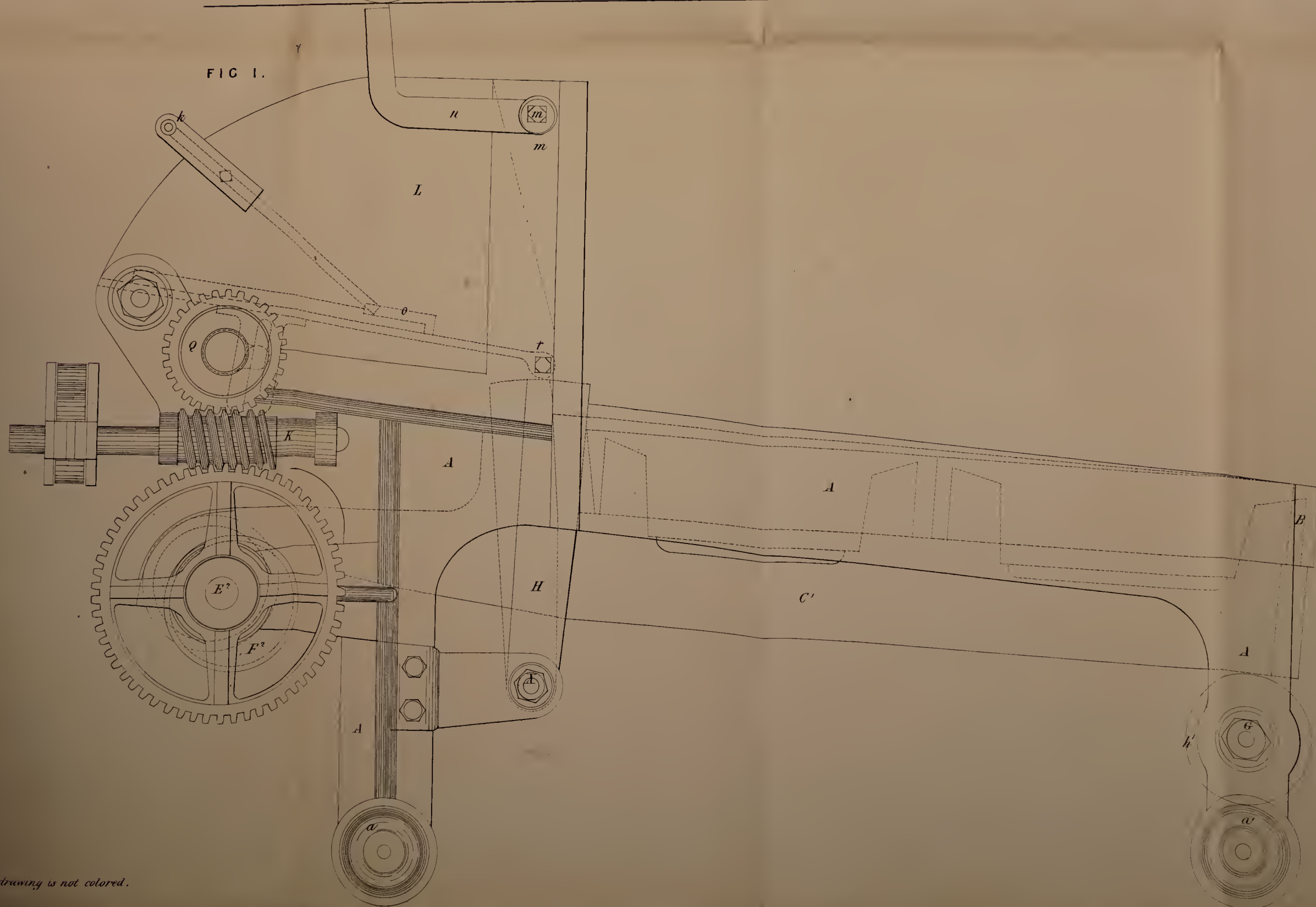
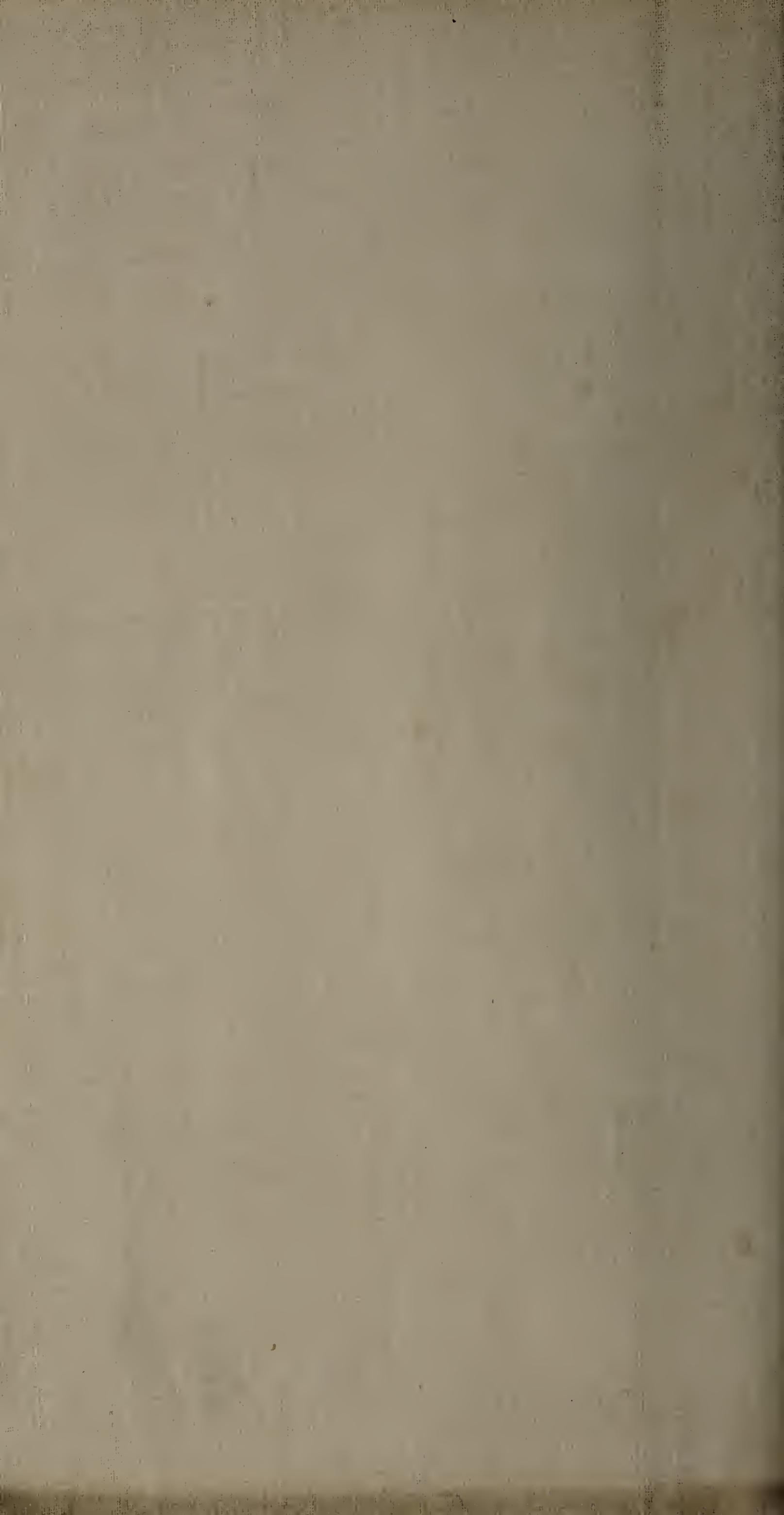


FIG. 1.

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FIG. 5.

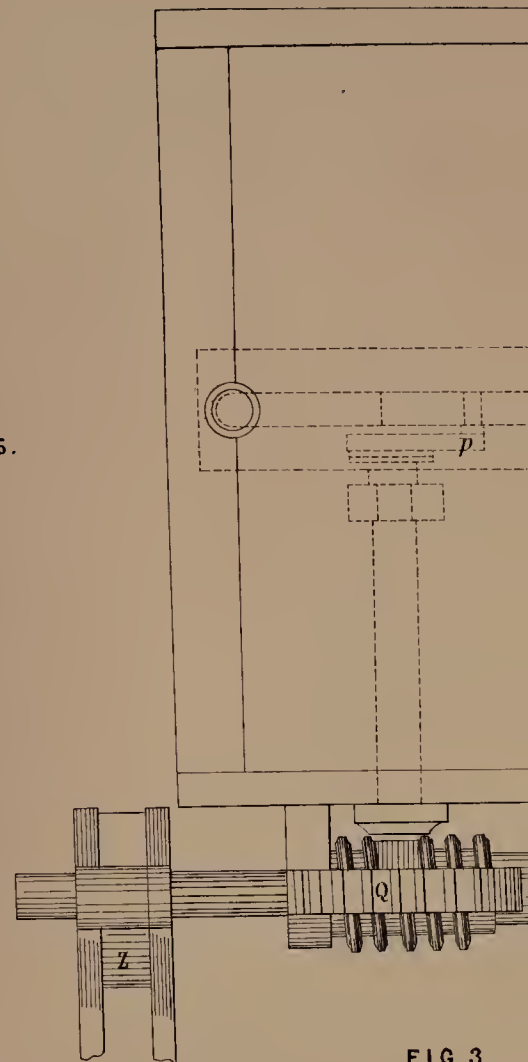


FIG. 3.

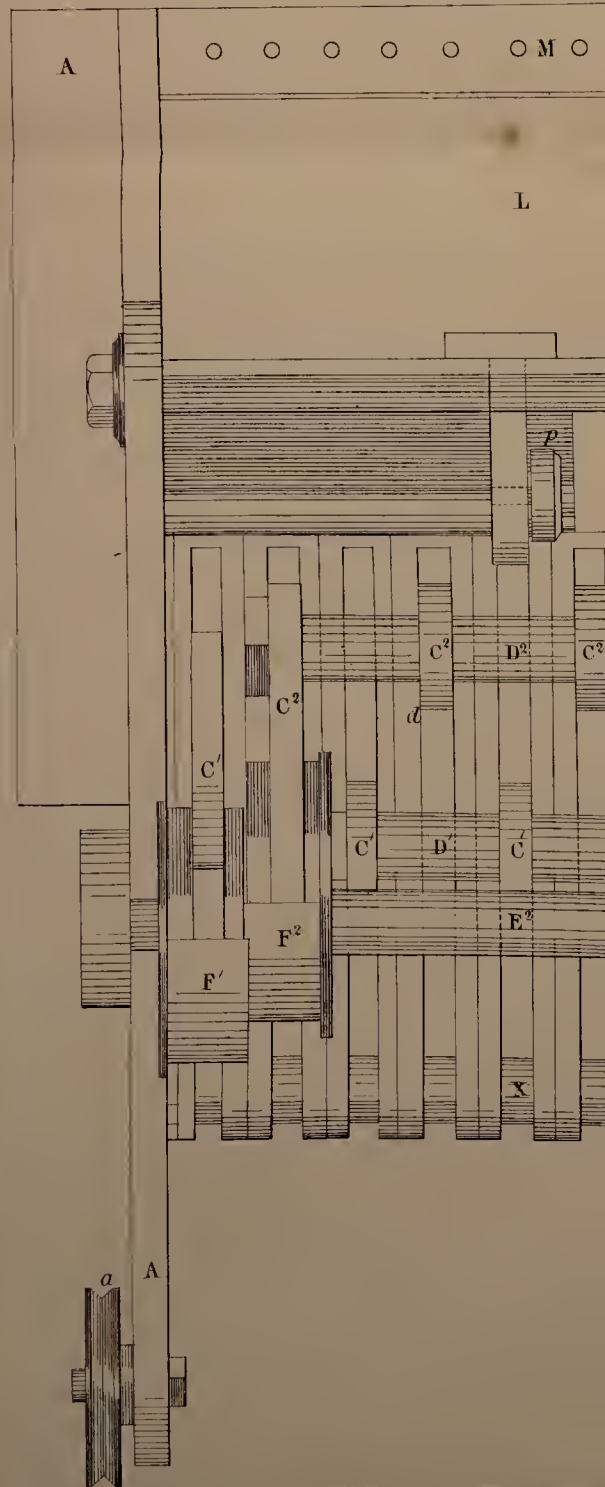


FIG. 1^a

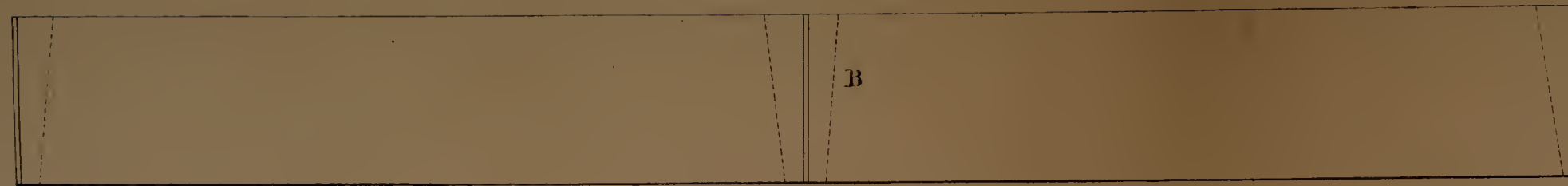


FIG. 2^a



FIG. 4^a

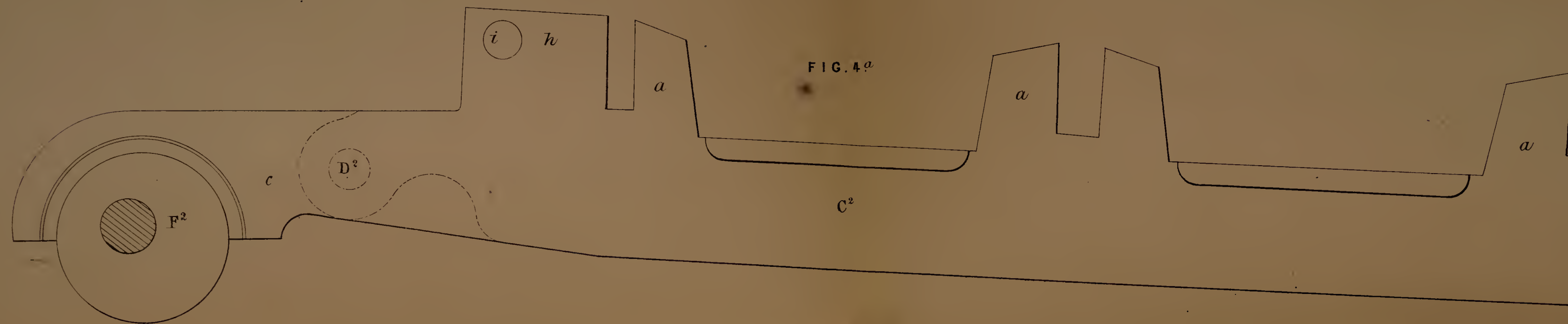


FIG. 3^a

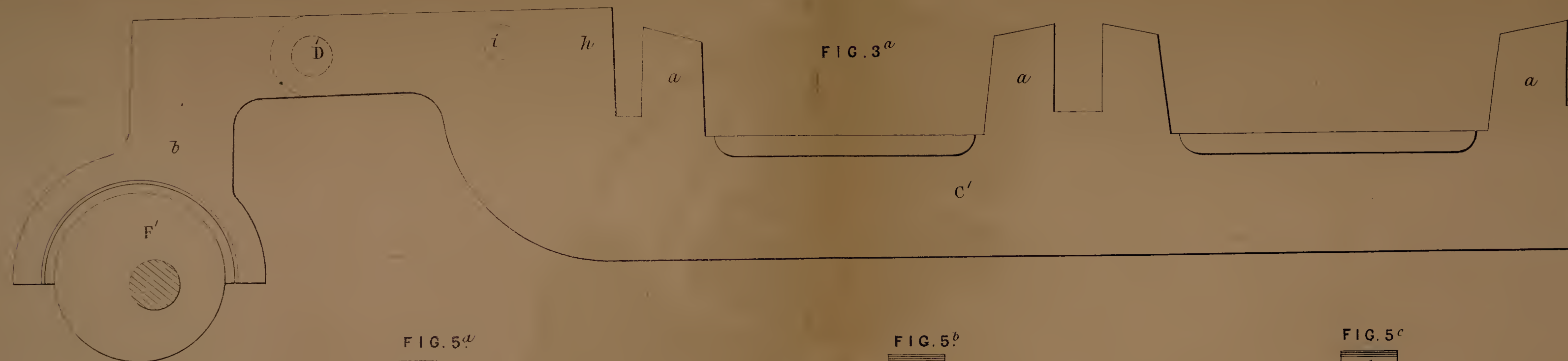


FIG. 5^a

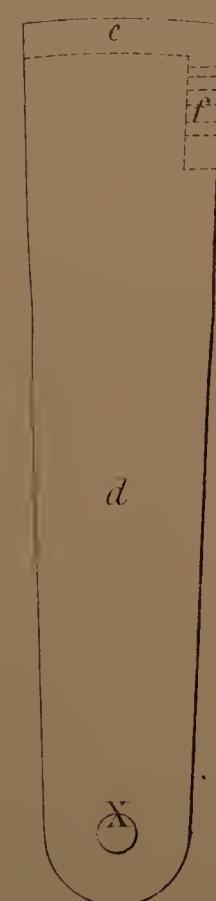


FIG. 5^b

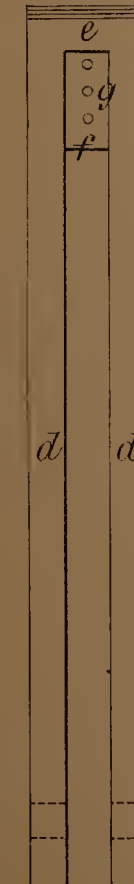
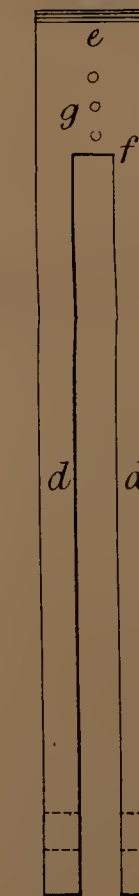


FIG. 5^c



The enrolled drawing is partly colored



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the other set, namely, the 2nd, 4th, 6th, and 8th. The carriages C¹ are attached in front to a cross bar D¹, but the two outermost of the set have prolongations of a crutch form, as shewn at *b*, in Figure 3^a, which rests on two excentrics F¹, F¹, attached to a revolving shaft E². The other carriages C², are attached
5 in front to a second cross bar D², which is placed higher than D¹, and a little in advance of it, and the two outermost of this series have also prolongations (*c*, *c*,) somewhat similar to *b*, *b*, (see Figure 4^a,) which rest on two other excentrics F², F², attached to the same shaft E². Between each of the front uprights *a*, and the end of the carriage there is a stud *h*, through which a
10 cross pin *i* is passed, for a purpose to be herein-after explained. The carriages of both sets rest at the back and on revolving friction pullies *h*¹, *h*¹, which are attached to a fixed shaft G, placed at a lower level than the shaft E², so that the carriages and fire-bars may have a slight inclination from front to back. H, H, are a series of vertical feeding bars equal in number to the carriages
15 C¹, C², which are placed in front of the horizontal fire bars B, B, and at right angles with them, and are also connected with and acted on by the carriages C¹, C², in manner to be presently explained. A side view of one of these feeding bars is given separately in Figure 5^a, a front view of it in Figure 5^b, and a back view of it in Figure 5^c. The bar it will be seen is hollow and
20 formed of two side pieces *d*, *d*, a solid top piece *e*, and a front piece *f*, perforated with air holes *g*, *g*, which last piece however extends but a short way down, leaving the two side pieces separated throughout the rest of their length like the two prongs of a fork. Each bar rests by its front piece *f* on one of the carriages (sitting astride of it, as it were) in the space between the front
25 upright *a* and the stud *h*, (see Figure 3^a and Figure 4^a,) and is connected at bottom by the two side pieces *d*, *d*, to a cross shaft X, which passes underneath the furnace, and on which it is free to turn to the extent permitted by the carriage projections *a* and *h*. I is a cog wheel keyed on one end of the shaft E²; and K an endless screw which gives motion to I, and is itself driven by
30 any convenient first mover. L is the hopper, and *o*, a sliding bottom, which is actuated by a crank P, (see Figure 3,) which is driven by a cog wheel Q, which derives its motion from the endless screw K, and *r* is the dead plate. The back of the hopper turns on hinges at *k*, so that it may be thrown up occasionally into the position indicated by the dotted lines, in order to admit
35 of the coals being thrown in by hand. M is a water cistern, which is interposed between the hopper and the fire to prevent the fresh fuel in the former from becoming ignited, and swings on hollow journals *m*, *m*, through one of which cold water is kept constantly flowing from some convenient source, and through the other, the water after being partially heated, is as constantly

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discharged. N is a lever attached to one of the journals *m*, by pressing down which the cistern may be more or less elevated according to the thickness desired to be given to the feed. The mode in which the apparatus which has been just described operates is as follows:—The fresh fuel is pushed forward by the action of the wheel Q and crank P from off the dead plate *r* on to the vertical feeding bars H, H. The rotation of the shaft E² and of the eccentrics attached to it F¹, F¹, F², F², causes the carriage bars D¹ and D² to rise and advance and fall and recede alternately, while they the carriage bars impart a like alternating motion to the carriages C¹, C², and to the rows of fire bars resting upon them; that is to say, the rows of the bars are so acted upon that six of them (reckoning them in alternate order) are always on the rise and advance, and the remaining five always falling and receding, or vice versâ. At every rise and advance again of either of the sets of carriages the cross pins *i* of the studs *h* catch against the back of the feeding bars, and carry them forward with the carriages, while at every return and fall of either set the front upright *a* catches against the front of the bars and carries them backwards. The general result is that by the alternately rising and advancing and falling and receding motion given to the fire bars the fuel in the course of combustion is made to advance gradually towards the back of the furnace, while the to and fro motion of the feeding bars H, H, causes the fresh fuel as it drops upon them to be projected or thrust forward into the burning mass. The air again which rushes through the holes in the feeding bars H, H, and up through the apertures in the hollow fire bars B, B, as well as between the fire bars themselves, contributes greatly to keep up an intensity of combustion within the furnace. The rate of progression to be given to the fuel must of course depend on the velocity given to the endless screw and the parts which derive their motion from it, and that may be diminished or increased at pleasure by many well-known means. In the Drawings, Figure 3 and 5, the velocity is represented as determined by means of a ratchet wheel Z, which is keyed upon the screw spindle, which is again acted upon by the lever Z², to the outer end of which the power from the prime mover is applied.

In the second form of furnace represented in Figure 6, the fire bars are placed crosswise instead of longitudinally, and have simply a to and fro motion given to them, in manner following:—A, A, is the framework, which is mounted on wheels, as in the first form of furnace. B is an oscillating shaft, to which motion is given by a lever C and rod D, which last is connected to any convenient first mover. N, N, are the fire bars, which are nine in number, or may be of any other convenient number, and centred on pins *i*, *i*, projecting from the sides of the framework; a top view of one of these bars is given

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separately in Figure 6^a; they are made hollow, and of a wedge-like form, with the broad end uppermost. At top they have narrow slits in them for the passage of air, and at bottom are wholly open. In their longitudinal profile, that is, from front to back, they are of the form of a segment of a circle struck from the pin *i* as a centre, and from the top they taper gradually towards the bottom. Of these bars, every alternate one, except the last, (say the second, fourth, sixth, and eighth, marked N, *g*,) is prolonged downwards, and pinned to a horizontal rod *f*, which is connected at the near end to a short arm *e* keyed on the main shaft, so that as that shaft oscillates it imparts a to and fro' motion to the rod *f*, and the like motion to the prolonged bars N, *g*, which in their turn cause the short bars N, *h*, against which they abut, to move also forwards and backwards, whereby a continuously progressive motion is given to the whole mass of ignited fuel. The ninth or last of the fire bars N, *s*, is worked separately from the others by a hand rod *w*, which rests at *t*, on a pin *u*, which is supported by a stud *v*, raised on one of the end bearings of the shaft B, and when it is worked to and fro' by this hand rod, (which it is the office of the stoker to do occasionally,) it carries forward the exhausted fuel under the fire bridge *x*, whence it falls into the ash-pit beneath. L is the hopper, the back of which is jointed at *k*, like that first before described. *l* is the sliding bottom, which is worked by two arms *k*, projected from the oscillating shaft B. *m* is the dead plate, from which the fuel is first projected on to the fire bars N, N. *o* is a water cistern, with hollow journals, as before, and *p* a lever by which it is raised or lowered.

And having now described my said Invention or the several parts thereof, and the manner in which the same is to be performed, I hereby declare that I lay no claim to the employment in self-feeding furnaces of moving bars or of hollow bars or of bars with air apertures through them, or of wheel-work to actuate such bars, and that neither do I claim any of the parts of the hoppers before described, but that the improvements which I claim as constituting my said Invention are as follows:—

First, I claim the employment of fire bars made to rise and advance, and fall and recede, alternately, by means of under carriages acted on by excentrics attached to a revolving shaft or other equivalent means, as exemplified in the furnace first herein-before described.

Second, I claim the employment of vibrating feeding bars, placed at right angles to the fire bars, as before described, and whether made to vibrate by the means before described or by any other suitable means.

Third, I claim the employment of fire bars placed crosswise of the furnace, and made (all but the last) to move to and fro' by means of an oscillating

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shaft and connecting arms and rods, as exemplified in the second form of furnace before described.

Fourth, I claim the employment of a rod to work the last of a series of fire bars placed crosswise as aforesaid, separately from and independently of the others, as before described. 5

Fifth, I claim the connecting of the sliding plate of the hopper to the same oscillating shaft by which the fire bars are actuated, as exemplified in the second form of furnace before described, so that by one movement not only the burning fuel is moved forward but a supply of fresh fuel is furnished.

Sixth, I claim the employment of an overflowing water cistern interposed 10 between the hopper and furnace, as before described.

In witness whereof, I, the said James Wills Wayte, have hereunto set my hand and seal, this Sixteenth day of September, in the year of our Lord One thousand eight hundred and forty-seven.

JAMES WILLS (L.S.) WAYTE. 15

AND BE IT REMEMBERED, that on the Sixteenth day of September, in the year of our Lord 1847, the aforesaid James Wills Wayte came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And also the Specification aforesaid was stamped 20 according to the tenor of the Statute made for that purpose.

Enrolled the Eighteenth day of September, in the year of our Lord One thousand eight hundred and forty-seven.

LONDON:

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